



Fact Sheet

United States Nuclear Regulatory Commission
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Radiation Monitoring at Nuclear Power Plants and the “Tooth Fairy” Issue

Monitoring of Strontium-90

The U.S. Nuclear Regulatory Commission (NRC) is the Federal agency responsible for protecting public health and safety with regard to the use of nuclear materials in commercial nuclear power plants that generate electricity. Its regulations are based on sound science to make determinations that adequate protection of the public and the environment is being maintained. As part of its responsibility, NRC requires nuclear power plant operators to have effluent and environmental monitoring programs to ensure that the impacts from nuclear plant operations are minimized. The results of this monitoring have shown the presence of natural and weapons fallout radiation and a few instances of very low levels of radioactive material of nuclear power plant origin.

Strontium, a silvery-white alkaline earth metal that exists in several stable and unstable (or radioactive) isotopes, is one substance that is monitored. One of these radioactive isotopes, strontium-90 (Sr-90) does not occur naturally. It is produced in nuclear fission--splitting of an atom's center that releases energy--and has a half-life (decay of half its radioactivity) of about 28 years. In the United States, the primary pathway for Sr-90 to enter the body is through ingestion of contaminated foods and cow's milk.

A number of studies by the Radiation Public Health Project assert that levels of Sr-90 are rising in the environment and that these increased levels are responsible for increases in cancers, particularly cancers in children, and infant mortality. The group claims that radioactive effluents from nuclear power plants are directly responsible for the increases in Sr-90. In one 2003 study, researchers reported that Sr-90 concentrations in baby teeth are higher in areas around nuclear power plants than in other areas. This has sometimes been referred to as the “Tooth Fairy Project.” However, numerous peer-reviewed, scientific studies do not substantiate such claims.

The NRC has established strict limits on the amount of radioactive emissions allowed to be released from nuclear power plants to the environment

- Nuclear power plants are required to limit the concentrations of radionuclides that may be released into the environment to levels that are as low as reasonably achievable.
- All power plant operators are required to monitor radioactive airborne and liquid discharges from the plant and to file a report of these discharges annually with the NRC. These reports, which are publicly available on the NRC's Agencywide Documents Access Management System (ADAMS), list the radioactive isotopes released, the quantity released and the radiation dose to the public.
- As can be seen in these reports, the concentrations of radionuclides released into the environment from a nuclear facility are very low and many, including SR-90, are not detectable in the environment.

Nuclear power plant operators maintain an environmental monitoring program that is reviewed and inspected regularly by NRC

- To demonstrate that the plant is within the regulatory limits, operators regularly sample and analyze the surrounding soil, vegetation, cow's milk, and water. In a given year, the nuclear power plant staff samples and analyzes hundreds of environmental samples.
- The results of environmental monitoring and assessment effort are provided to the NRC in an annual report, which is available to the public on ADAMS.
- Sr-90 is rarely detectable in the effluent stream due to very low or nonexistent concentrations. In order for Sr-90 to be in the environment from nuclear power plants, it would have to be seen in significant quantities in the effluent stream from these facilities.

The Sr-90 in the atmosphere from nuclear power plants is extremely small compared with other man-made sources

- At an individual nuclear power plant, the amount of Sr-90 is so low that it is usually at or below the minimum detectable activity of very sensitive detection equipment.
- Radiation doses from Sr-90 to individuals living within 30 miles of a nuclear power plant would be a tiny fraction of less than one millirem.
- Approximately ninety-nine percent of the Sr-90 in the environment comes from fallout from above-ground explosions of worldwide nuclear weapons testing.
- Radioactive releases from the 1986 Chernobyl nuclear power plant accident in the Ukraine are the second largest source of Sr-90 in the environment.
- It is reasonable to conclude that the Sr-90 that can be detected in, for example, baby teeth is attributable to fallout from nuclear weapons testing or the Chernobyl accident.

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